

Appln. No. 09/805,833

Response filed June 6, 2003

Response to Office Action dated March 10, 2003

Applicant's invention, as described in claim 1, involves a color laser display having a red, green and blue laser light sources for emitting, respectively, red, green and blue laser light, a modulation device for modulating the red, green and blue laser light, based on red, green and blue image signals, a screen for displaying red, green, and blue when irradiated with the red, green and blue laser light. A projection device projects the red, green and blue laser light onto the screen so that an image, carrying the red, green, and blue image signals, is displayed on the screen. An excitation solid laser unit, having a solid-state laser crystal doped with  $\text{Pr}^{3+}$  and a GaN semiconductor laser element emitting excitation light at a wavelength of 440 nm for exciting the solid-state laser crystal, is used as at least one of the red, green or blue laser light sources.

As set out in claim 8, this invention also pertains to a color laser display using red, green and blue laser light sources for emitting, respectively, red, green and blue laser light, a modulator for modulating the red, green and blue laser light based on red, green and blue image signals, a screen for displaying red, green, and blue when irradiated with the red, green and blue laser light, and a projector for projecting the red, green and blue laser light onto the screen so that an image carrying the red, green, and blue image signals is displayed on the screen. A fiber laser unit having a fiber with a  $\text{Pr}^{3+}$ -doped core and a GaN semiconductor laser element emitting excitation light at a wavelength of 440 nm for exciting the fiber serves as at least one of the red, green or blue laser light sources.

First, it should be noted that the Examiner admits Knize does not teach all the features of the invention as claimed. In particular, the Office Action at page 3 recognizes that Knize does not teach an excitation laser unit as claimed.

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Although the Office Action then looks to DenBaars to remedy this shortcoming of Knize, such action is not well-taken, since, as explained below, DenBaars does not remedy the shortcomings of Knize.

The Examiner states that "DenBaars et al. teach the use of gallium nitride as a pump source to provide the advantage of allowing for the entire visible region of the wavelength spectrum to be pumped (see Col. 2, lines 24-[2]8)". However, Applicants wish to point out that the passage cited by the Examiner is only a summary of the DenBaars' invention, and that DenBaars teaches in detail at column 3, lines 13-38 that gallium nitride, along with aluminum and indium, is used as the pump source for the solid state laser to generate pump light (blue, green and red lights). Further, in DenBaars et al., an erbium (Er) solid state laser (which some examples describe as gallium nitride doped with erbium) is employed in each of the examples. However, those skilled in the art will appreciate that erbium is generally employed to obtain light for oscillation having a wavelength of 1.55 $\mu$ m, and not for obtaining RGB light (examples 1-6). Accordingly, DenBaars, which provides output radiation that is not RGB light, in no way even suggests Applicants' claimed invention.

Therefore, DenBaars et al. does not teach or suggest the feature of the present invention, providing that a GaN semiconductor laser element is employed to excite the solid state laser crystal to thereby emit RGB light, since the erbium-doped active medium in DenBaars will not emit visible light.

The remaining rejected claims, claims 2-7 and 9-14, all ultimately depend from, and so incorporate by reference all the features of, claims 1 and 8, including those

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features already shown to avoid the cited art. These claims therefore patentably distinguish over such art at least for the same reasons as their respective base claims.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

Claims 2-7 and 9-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Knize in view of DenBaars as previously applied to claims 1 and 8, and further in view of U.S. Patent No. 5,727,007 to Smart et al. Applicant respectfully traverses this rejection and submits the following arguments in support thereof.

Claims 2-7 and 9-14 depend, respectively, from claims 1 and 8, and so incorporate by reference all the features of those base claims, include the claim features just shown to avoid Knize and DenBaars.

Smart in no way remedies the deficiencies of Knize and DenBaars.

Smart allegedly teaches emitting RGB light using a solid state laser.

Regardless of whether that is true, Smart does not teach or suggest pumping light with a GaN semiconductor laser element at a single wavelength, much less at 440 nm, as claimed.

Unlike Smart, which require an excitation light source that excites light at two wavelengths (1010nm and 835nm), the present invention requires an excitation light source which excites light at a single wavelength. Therefore, by virtue of the present invention, high efficiency (30 to 50%) is realized and an output on the order of a watt is available. Further, in the present invention, all of red light, green light and blue light can be emitted by exciting the solid state laser crystal with the GaN semiconductor laser element emitting excitation light at

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a wavelength of 440nm. Therefore, the claimed invention provides the important benefits of high efficiency and high output power, which are very important for a laser display.

Such unexpected benefits constitute secondary indicia of non-obviousness, and as such, are further proof of the patentability of this invention.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

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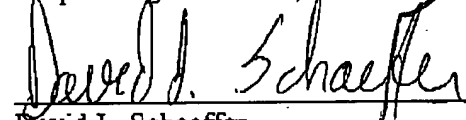
CONCLUSION

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Applicant respectfully submits that all outstanding rejections have been addressed and are now either overcome or moot. Applicant further submit that all claims pending in this application are patentable over the prior art. Reconsideration and withdrawal of those rejections and objections is respectfully requested.

Favorable consideration and prompt allowance of this application is respectfully requested. In the event that there are any questions, or should additional information be required, please do not hesitate to contact applicant's attorney at the number listed below.

Respectfully submitted,



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